

REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1, 2, 4, 6 - 11, 13 - 16, 18 - 23, and 25 - 28 are pending in the application with Claims 1 and 13 being independent claims. Claims 3, 5, 12, 15, 17 and 24 have been presently cancelled without prejudice or disclaimer. Claims 1, 2, 4, 7, 8, 9, 13, 14, 20, and 21 have been presently amended, and Claims 25 - 28 have been presently added. No new matter was added, as discussed below.

In the Office Action, Claims 8 and 20 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite; Claims 1, 3-4, 7-12 were rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi et al (U. S. Pat. No. 6,341,701). Claims 1-2, 4-9, 11-12 were rejected under 35 U.S.C. 102(b) as being anticipated by Waku et al (U. S. Pat. No. 5,981,415). Claims 1, 3, 7 and 10-12 were rejected under 35 U.S.C. 102(b) as anticipated by Maebashi (U. S. Pat. No. 5,098,571). Claims 1-12 were rejected under 35 U.S.C. 103(a) as obvious over Waku et al in view of Takahashi et al. Claims 13-24 were rejected under 35 U.S.C. 103(a) as being unpatentable over Waku et al in view of Takahashi et al, Maebashi, and Larsen et al (U. S. Pat. No. 5,716,559).

Applicants acknowledge with appreciation the courtesy of Examiner Robinson and Primary Examiner Blackwell to interview with Applicants' representative on December 18, 2007 during which time the issues in the outstanding Office Action were discussed as substantially summarized hereinafter.

Regarding the claim amendments, independent Claims 1 and 13 have been amended to include the following features:

(1) the ceramic sintered body is porous as recited previously in Claim 12 (or Claim 24),

(2) the bonding layer is a sintered polycrystalline body comprising a plurality of ceramic fine particles each having an average particle size smaller than the ceramic coarse particles as recited previously in Claims 3 and 5 (or Claims 15 and 17), and

(3) the ceramic sintered body (including the ceramic coarse particles and the bonding layer existing between the ceramic coarse particles) has an average pore diameter of 5 μm to 50 μm .

Furthermore, new dependent Claims 25 - 28 have been added with Claims 25 and 26 being dependent from Claim 1, while Claims 27 and 28 are dependent from Claim 13. These claims define the average particle size of the ceramic coarse particle is 30 μm to 70 μm and the average particle size of the ceramic fine particle is 0.1 μm to 20 μm , respectively.

The support for the recitation of “the ceramic sintered body has an average pore diameter of 5 μm to 50 μm ” can be found on page 15, lines 27 - 33 of the original specification (or publication paragraph [0068]), and support for the average particle sizes of the ceramic coarse and fine particles can be found on page 11, line 25 to page 12, line 16 of the original specification (or publication paragraphs [0055]-[0056]).

Regarding the 35 U.S.C. 112, second paragraph, rejection, Claims 8 and 20 as amended are believed not to be indefinite. Thus, the 35 U.S.C. 112, second paragraph, rejection has been addressed.

Regarding the 35 U.S.C. 102(b) rejection, as discussed during the interview, the ceramic porous sintered body defined by Claim 1 includes:

ceramic coarse particles and a bonding layer existing between the ceramic coarse particles to connect the coarse particles; and

a polycrystalline sintered body forming said bonding layer and including a plurality of ceramic fine particles having an average particle size smaller than the ceramic coarse particles,

wherein said ceramic porous sintered body, including said ceramic coarse particles and said bonding layer existing between the ceramic coarse particles, has an average pore diameter of 5 μm to 50 μm .

With such a structure, the bonding layer can mitigate thermal shock and efficiently reduce or even prevent cracks from occurring in the sintered body due to the breakage of ceramic particles when thermal stress is applied. See numbered paragraphs [0017] and [0034] in the publication.

Takahashi et al describe a ceramic porous body which can be molded at a low temperature where specific refractory facilities are not required (i.e. produced at a temperature of 300 $^{\circ}\text{C}$ or less). More specifically, Takahashi et al describe a porous substrate comprising a porous ceramic having relatively large pore diameter, and *a ceramic porous membrane having relatively small pore diameter formed on the surface of the substrate.*

See column 3, lines 3 - 7.

The Office Action *only refers* to the ceramic porous membrane formed on the ceramic porous body or substrate. Such a ceramic porous membrane consists of (1)ceramic particles having an average particle diameter of 0.1 μm to 1 μm and (2) ceramic sol particles having an average particle diameter of 5 to 100 nm (or 0.005 μm to 0.1 μm), as the Office Action pointed out. However, the *pore diameter of the ceramic porous membrane is less than 1 μm* , which can be seen in Table 2 (0.1 - 0.2 μm for Examples 1 to 4) and Table 4 (0.07 - 0.08 μm for Examples 5 to 7).

During the interview, the examiners seemed to agree that this language in Claim 1 would address the issues identified in the last Office Action with respect to Takahashi et al. However, Examiner Robinson indicated that, in her view, the claims when read broadly could

read on the porous substrate assembly described at col. 6, lines 5-14, of Takahashi et al. However, in that porous substrate assembly, the only component which has a larger pore diameter is the tubular porous material acting as a substrate for the smaller pore diameter coating. The substrate region of the porous substrate assembly in Takahashi et al does not include a bonding layer (or more specifically does not include a polycrystalline bonding layer) existing between the ceramic coarse particles to connect the coarse particles, and therefore would not read on a ceramic porous sintered body (including ceramic coarse particles and a bonding layer existing between the ceramic coarse particles) having an average pore diameter of 5 μm to 50 μm , as defined in the independent claims.

In other words, Claim 1 defines a ceramic porous sintered body that is not a ceramic porous membrane deposited on the ceramic porous substrate, but rather is a ceramic porous sintered body or substrate having an average pore diameter of 5 μm to 50 μm . The ceramic porous sintered body includes ceramic coarse particles, a bonding layer existing between the ceramic coarse particles to connect the particles, and a polycrystalline sintered body forming the bonding layer and including a plurality of ceramic fine particles having an average particle size smaller than the ceramic coarse particles.

Accordingly, Takahashi et al fail to disclose or suggest (1) a bonding layer formed with a polycrystalline sintered body or (2) an average pore diameter of 5 μm to 50 μm in a ceramic porous sintered body including ceramic coarse particles and a bonding layer existing between the ceramic coarse particles. As a result, the bonding layer formed by the ceramic sol particles in Takahashi et al cannot mitigate thermal shock or reduce cracking in the sintered body due to the breakage of ceramic particles when thermal stress is applied.

Waku et al describe a ceramic composite material consisting of two or more crystal phases of different components and describe that the ceramic material used consists of at least one crystal phase having pore. Waku et al further describe that two ceramic powders are

mixed in such a ratio to form a ceramic composite material having a desired composition. However, Waku et al fail to disclose the sizes of coarse and fine particles and pores defined by the particles, therefore, the bonding layer connecting the coarse particles together cannot be identified at all. The above-mentioned advantages or specific effects discussed above cannot be achieved by Waku et al.

Maebashi describes a process for manufacturing a ceramic filter wherein the filter is produced by preparing an aggregate consisting of alumina coarse particles and a sintering aid including alumina-zirconia. However, Maebashi fails to disclose that a polycrystalline sintered body forms the bonding layer. As a result, the deficiencies of Takahashi et al and Waku et al are not overcome by Maebashi, and the above-mentioned advantages or specific effects of the present invention cannot be achieved by Maebashi.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. 102(b) rejections of Claims 1, 3 - 4, 7 - 12 as being anticipated by Takahashi et al, of Claims 1 - 2, 4 - 9, 11 - 12 as being anticipated by Waku et al, and of Claims 1, 3, 7 and 10 - 12 as being anticipated by Maebashi.

Regarding the 103(a) rejections, in the Office Action, Claims 1 - 12 were rejected under 35 U.S.C.103(a) as obvious over Waku et al in view of Takahashi et al, and Claims 13 - 24 were rejected under 35 U.S.C.103(a) as being unpatentable over Waku et al in view of Takahashi et al, Maebashi, and Larsen et al.

As explained above, Waku et al fail to disclose the sizes of coarse and fine particles and pores defined by the particles, therefore, the bonding layer connecting the coarse particles together cannot be identified at all. Therefore, Waku et al fail to disclose or suggest a polycrystalline sintered body forming a bonding layer.

On the other hand, Takahashi et al describes a *ceramic porous membrane* formed on the ceramic porous body or substrate which can be molded at a temperature at which any specific refractory facilities are not required, i.e. produced at a temperature of 300 °C or less (low temperature sintering). However, as noted above, Takahashi et al fails to disclose or suggest (1) a bonding layer formed with a polycrystalline sintered body or (2) an average pore diameter of 5 µm to 50 µm in a ceramic porous sintered body including ceramic coarse particles and a bonding layer existing between the ceramic coarse particles. As a result, the deficiencies of Waku et al are not overcome by Takahashi et al.

Furthermore, both Waku et al and Takahashi et al fail to disclose or suggest that the bonding layer formed with the polycrystalline sintered body can mitigate thermal shock and efficiently prevent cracks from occurring in the sintered body due to the breakage of ceramic particles when thermal stress is applied.

Therefore, the U.S.C.103(a) rejection over Waku et al in view of Takahashi et al, should be withdrawn.

As to the rejection of Claim 13 over Waku et al in view of Takahashi et al, Maebashi, and Larsen et al, Claim 13 recites:

13. A ceramic filter with a honeycomb structure including a pillar-shaped porous ceramic member or a combination of a plurality of the pillar-shaped porous ceramic members in which a plurality of cells as a gas passageway are arranged side by side in a longitudinal direction through cell walls and either one end portions of these cells are plugged, the filter comprising:

a ceramic porous sintered body including ceramic coarse particles and a bonding layer existing between the ceramic coarse particles to connect the coarse particles, and

a polycrystalline sintered body forming said bonding layer and including a plurality of ceramic fine particles having an average particle size smaller than the ceramic coarse particle,

wherein said ceramic porous sintered body, including said ceramic coarse particles and said bonding layer existing between the ceramic coarse particles, has an average pore diameter of 5 µm to 50 µm.

The claimed polycrystalline sintered body forming the bonding layer existing between the ceramic coarse particles to connect the particles (as noted above) reduces thermal stress and improves heat resistance by the sealing material layer. This permits one to adjust the size freely by increasing and decreasing the number of the honeycomb structural bodies, and it therefore makes it possible to catch particulates and the like in the exhaust gas more efficiently by the cell walls separating the cells.

Furthermore, with such a structure, it is possible to catch particulates in the exhaust gas completely for long periods, reduce the deterioration of a catalyst when it is carried, prevent the breakage of the filter since minute cracks generated by impact, thermal stress or the like do not grow to be a visible size, prevent ceramic particles from shedding accompanied with the occurrence of cracks, improve its heat resistance, and adjust the size freely. See numbered paragraphs [0036] to [0038] in the published application.

Thus, the claimed elements work together in *an unexpected and fruitful manner*. The Supreme Court in *KSR International Co. v. Teleflex Inc. et al.* 2007 U.S. LEXIS 4745 recently reinforced the role of such factors in deciding obviousness. The Court stated that:

In *United States v. Adams*, 383 U. S. 39, 40 (1966), a companion case to *Graham*, the Court considered the obviousness of a wet battery that varied from prior designs in two ways: It contained water, rather than the acids conventionally employed in storage batteries; and its electrodes were magnesium and cuprous chloride, rather than zinc and silver chloride. The Court recognized that when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result. 383 U. S., at 50-51. It nevertheless rejected the Government's claim that Adams's battery was obvious. The Court relied upon the corollary principle that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious. *Id.*, at 51-52. When Adams designed his battery, the prior art warned that risks were involved in using the types of electrodes he employed. The fact that the elements worked together in *an unexpected and fruitful manner* supported the conclusion that Adams's design was *not obvious* to those skilled in the art. [Emphasis added.]

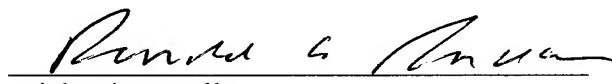
None of the cited references describe these noted features of Claim 13 or the advantages thereof. M.P.E.P. § 2143.03 requires, to establish a case of *prima facie* obviousness, all the claim limitations must be taught or suggested by the prior art. Furthermore, the unexpected and fruitful manner in which the claim elements work together also supports a conclusion of non-obviousness.

Hence, for all these reasons, the U.S.C.103(a) rejection over Waku et al in view of Takahashi et al, Maebashi, and Larsen et al should be withdrawn.

Consequently, in view of the present amendment and in light of the forgoing comments, it is respectfully submitted that the present application is in condition for formal allowance. An early and favorable reconsideration of this application is therefore requested.

Respectfully submitted,

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